3. A "clean version" for each of the actions made above, and as indicated in the respective marked-up version, is attached hereto.

4. The total claims in this application include claims 63-87 and now stand at total of 25 claims which include two independent claims and a total of five excess claims.

REMARKS

The claims outstanding in this application are Claims 63-87. In consideration of the amendments made above and the Remarks which follow, applicant hereby respectfully traverses all rejections and objections and requests reconsideration and allowance of Claims 63-87 of this application.

The objection to the specification as to pages 15 and 16 have been corrected by the amendments to the respective specification pages thereby overcoming this objection.

The objection to the specification as to pages 26-28 with regard to Figure 6 and inlet slots 63 has been corrected by correcting the drawing to reflect reference character 63 as the inlet slots, including a marked-up red-line drawing sheet, and including a corrected substitute formal drawing sheet thereby overcoming this objection.

The rejection under 35 U.S.C. § 112, lacking a clear antecedent basis in claim 63 for "said high-pressure oxygenated ozone-treated water mixture" and in claim 74 for "its resultant

product" have been corrected by amending each claim accordingly thereby overcoming this rejection.

Claims 63-74 were rejected under 35 U.S.C. § 103 as being unpatentable over Moorehead ['980] in that the Moorehead '980 patent discloses a method of removing contaminants substantially as claimed except that the '980 patent does not recite steps of directing oxygenated ozone treated water into an air saturator and directing a high pressure oxygenated ozone-treated water mixture into a blender. The Examiner concluded that the air contactor 24 and particle mixing system 10 utilized in the '980 patent are patentably indistinguishable from the recited air separator and blender, respectively, and as such, it would have been obvious for one skilled in the art to modify the method of the '980 patent by utilizing the steps recited in the present invention. Applicant submits that the claims as amended rise above the art cited and are not obvious in this regard.

The distinguishing feature of the present invention relates to application of a suction pump 61, strategically placed between the blender outlet port 42 and the saturator inlet port 72, to effect the directing of influent into the blender, to effect the directing of high-pressure oxygenated ozone-treated water into the blender, and to effect the directing the white-water mixture into the separator. Such placement causes a drawing or forcing in of the influent as well as the high-pressure oxygenated ozone-treated water into the blender wherein the two mix and instantly create a

white-water mixture which is drawn out of the blender and into the separator. Moreover, the influent is drawn into a mixing chamber of the blender through a plurality of slots adjacent to the mixing chamber while the high-pressure oxygenated ozone-treated water is drawn into the mixing chamber through a plurality of nozzles or jets on the walls of the mixing chamber. This separate intake of each component [influent and high-pressure oxygenated ozone-treated water] into the mixing chamber, at the pressures indicated, create the instant white-water effect. The transfer of the resultant white-water mixture into the separator by way of the suction pump, because of its structure and operation, minimizes, if not eliminates, shear to the elements comprising the white-water mixture thereby maximizing the separation effect of waste from the white-water mixture in the separator.

Nothing in the '980 patent teaches, suggests, or touches upon these steps and features. The '980 patent directs influent and air-saturated water into a helical tube of a considerable length and diameter wherein the influent and air-saturated water mix in an attempt to create a white-water effect and, by gravity and forced air are pushed into a separator. Nor does it indicate the use of a suction pump, effecting mixing of influent and high-pressure oxygenated ozone-treated water in a mixing chamber, directing influent into the mixing chamber through a plurality of slots, nor directing high-pressure oxygenated ozone-treated water into the mixing chamber through a plurality of nozzles on the wall

of the mixing chamber. The features of the present invention are what cause the immediate mixing of the two components [influent and high-pressure oxygenated ozone-treated water], immediate creation of a white-water mixture from such mixing, and immediate, non-shearing discharge of the white-water mixture into a separator. Therefore a person of ordinary skill in the art would not achieve the present invention as set forth in the claims when utilizing the steps of the '980 patent. To achieve the steps of the present invention, the skilled artesian must modify the '980 patent to such an extent [suction pump use, suction placement, mixing chamber, manner of entry of influent and high-pressure oxygenated ozone-treated water into the mixing chamber, and immediate creation of a white-water mixture and its immediate non-shearing discharge into a separator] rendering the result clearly patentably distinct from the '980 patent. Such is the case in the present invention. The present application also is a continuation-in-part of the now issued '980 patent.

As to the issue of the provisional rejection of Claims 63-74 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 41-48 of co-pending Appln. No. 10/032,397 should such claims [Claims 41-48] mature to a patent, said co-pending application has abandoned and, based on the amendments made to the present claims and remarks set forth, the present outstanding claims [63-87] are patentably distinct

from said co-pending application and no terminal disclaimer is now required.

For the foregoing reasons, applicant believes the claims as amended and the additional claims stand apart from the prior art and are patentable distinct over the '980 patent. Applicant hereby requests early reconsideration, allowance, and issue of this application.

Respectfully submitted,

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encl:
(1) Marked-up version of matter being changed/replaced
(2) Clean version of changes made
(3) Red-line copy of Figure 6
(4) Corrected substitute sheet for Figure 6

JAN 2 3 2003
PATENT & TRADEMARK OFFICE
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Appln.No.: 09/732,164 GAU: 1724

Examiner: MOOREHEAD, *et. al.* Dkt.No: MOORJ-02

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Marked-up Version of Matter Being Changed/Replaced

Amendments to page 15, line 10, through page 16, line 22:

The HPOM (designated by flow arrow X in Figure 1B) is discharged and drawn into a blender 51 at between about 80-150 psi; with 120 psi being optimal where it is blended (mixed with) incoming raw influent. Raw influent is drawn into the blender 51 at a pressure significantly less than the pressure of the HPOM by a conventional disk suction pump 61. The preferred pressure is zero to negative for the raw influent; with negative pressure being optimal. When the HPOM comes into contact with the lower pressure / negative pressure created by the drawing-in of the raw influent, because of the significant degree of pressure difference, the HPOM stream turns to white-water (countless numbers of dense, opaque micro-bubbles) and immediately blends or broadcasts into the raw influent. The white-water is injected through the jet inlets or nozzles 53 around the perimeter of the inner wall 64 of the mixing chamber 60 to thereby blend with the raw influent stream as shown in Figure 6. The ionized white-water micro-bubbles blend with the negatively-charged organic contaminants to form large buoyant clusters of micro-bubble-coated organic particles. The resulting stream herein (consisting of the

HPOM white-water and raw influent) is referred to as a white-water process (WWP) stream.

The WWP stream is discharged (as designated by flow arrow Y in Figure 1B and in Figure 7), via a tangential port 72, into the base of a hydrocyclone separator or separator where, because of the centrifugal rotation create an upward vortex column therein with high-pressure at the outer perimeter of the separator and lower pressures at the center of the vortex column. The divergent pressures of the WWP stream causes waste, which is covered with micro-bubbles, to separate from the WWP stream and further coalesce at the center (referred to as the waste water stream) and, thereby, causes clean or decontaminated water to separate from the remaining WWP stream at the high pressure perimeter (the decontaminated water is referred to as the DCW stream). The DCW stream is relatively clear and the waste water stream bears the color characteristics of the waste contaminants therein. Heavy and/or larger contaminants may be deposited into a sump 73 at the bottom of the separator and are drained therefrom at the drain port 74.

<u>Amendments to page 24, lines 11 through 20</u>:

Reference is now made to Figures 2 and 6. As the HPOM stream is forced into the blender 51 through the blender inlet port 52, raw influent is brought into the blender 51 through the raw influent inlet port 62; at a significantly lower pressure than the

pressure of the HPOM stream (preferably at zero to negative pressure). The effect is created by the disk suction pump 61 which draws the raw influent and the HPOM into the blender 51 [as well as out of the blender 51]. This disk suction pump 61 is a conventional vacuum pump such as Model/Part Number 215T CP3768T-4 402-12 provided by the DISCFLO Corporation of San Diego, California or its equivalent. The positioning of the disk suction pump 61, as illustrated in Figure 2, is important. It should be positioned between the blender exit port 54 and the separator inlet port 72 in order to draw raw influent and HPOM into and out of the blender 51 while in the process minimizing, if not eliminating completely, the shear and separation effects created by other pumps as described below.

Amendments to Claims:

63. (first amendment) A method of removing contaminants from influent water which comprises the steps of:

(a) directing oxygenated ozone-treated water into an air saturator;

(b) directing air at a pressure of between about 80 psi to about 150 psi into said air saturator to saturate said oxygenated ozone-treated water thereby creating a high-pressure oxygenated ozone-treated water mixture;

(c) directing said high-pressure oxygenated ozone-treated water mixture to a blender;

(d) at a pressure substantially lower than the pressure of said high-pressure oxygenated ozone-treated water mixture, directing influent water containing at least some contaminants to said blender;

(e) mixing said high-pressure oxygenated ozone-treated water mixture and said influent water thereby creating a plurality of micro-bubbles and entraining particles in a resulting white-water mixture;

(f) directing said white-water mixture to a separator;

(g) effecting said directing of steps (c), (d), and (f) by a suction Pump device attached between an outlet port of said blender and an inlet port of said separator.

(h) causing said white-water mixture to rotate about an axis in said separator so that waste water, with entrained contaminants, is separated from said white-water mixture by coalescing along said axis, and decontaminated water separated from said white-water mixture away from said axis and from said waste water;

(i) removing said waste water; and

(j) removing said decontaminated water.

74. (first amendment) The method according to claim 73 further comprises cleaning said filter and directing ~~its~~ a resultant product to said blender.

<u>Claims Added</u>:

75. A method of removing contaminants from influent water which comprises the steps of:

(a) directing oxygenated ozone-treated water into an air saturator;

(b) directing air at a pressure of between about 80 psi to about 150 psi into said air saturator to saturate said oxygenated ozone-treated water thereby creating a high-pressure oxygenated ozone-treated water mixture;

(c) directing said high-pressure oxygenated ozone-treated water mixture, through a plurality of nozzles on a wall of a mixing chamber of said blender, to a blender said mixing chamber;

(d) at a pressure substantially lower than the pressure of said high-pressure oxygenated ozone-treated water mixture, directing influent water containing at least some contaminants, through a plurality of slots adjacent to said mixing chamber, to said blender mixing chamber, said nozzles located above and in alignment with said slots.

P.26

(e) mixing said high-pressure oxygenated ozone-treated water mixture and said influent water in said mixing chamber thereby creating a plurality of micro-bubbles and entraining particles in a resulting white-water mixture;

(f) directing said white-water mixture to a separator;

(g) causing said white-water mixture to rotate about an axis in said separator so that waste water, with entrained contaminants, is separated from said white-water mixture by coalescing along said axis, and decontaminated water separated

from said white-water mixture away from said axis and from said waste water;

(h) removing said waste water; and

(i) removing said decontaminated water.

76. The method according to claim 75 further comprises effecting said directing of steps (c), (d), and (f) by a suction device attached between an outlet port of said blender and an inlet port of said separator.

77. The method according to claim 75 wherein said mixing is increased by causing turbulent flow over dimples in walls of said blender.

78. The method according to claim 75 further including regulating pressure of water passing from said air saturator to said blender at a predetermined level at between about 80 psi to about 150 psi.

79. The method according to claim 78 wherein said pressure is regulated to approximately 120 psi.

80. The method according to claim 75 further comprises collecting heavy particles at a lower end of said separator.

81. The method according to claim 75 further comprises removing air bubbles and buoyant particles from a predetermined location at about an upper end of said separator.

82. The method according to claim 81 further comprises removing air and any gases present from an upper end of said separator above said predetermined location.

83. The method according to claim 82 further comprises filtering toxins from said any gases present.

84. The method according to claim 75 further comprises filtering and reclaiming said waste water for additional treatment.

85. The method according to claim 84 further comprises returning filtered waste water to said blender.

86. The method according to claim 84 further comprises capturing recyclable waste in a filter and removing said recyclable waste for recycling.

87. The method according to claim 86 further comprises cleaning said filter and directing a resultant product to said blender.

Appln.No.: 09/732,164 GAU: 1724

Examiner: MOOREHEAD, *et. al.* Dkt.No: MOORJ-02

Clean Version of Changes Made Replaced

Amendments to page 15, line 10, through page 16, line 22:

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a1

The HPOM (designated by flow arrow X in Figure 1B) is discharged and drawn into a blender 51 at between about 80-150 psi; with 120 psi being optimal where it is blended (mixed with) incoming raw influent. Raw influent is drawn into the blender 51 at a pressure significantly less than the pressure of the HPOM by a conventional disk suction pump 61. The preferred pressure is zero to negative for the raw influent; with negative pressure being optimal. When the HPOM comes into contact with the lower pressure / negative pressure created by the drawing-in of the raw influent, because of the significant degree of pressure difference, the HPOM stream turns to white-water (countless numbers of dense, opaque micro-bubbles) and immediately blends or broadcasts into the raw influent. The white-water is injected through the jet inlets or nozzles 53 around the perimeter of the inner wall 64 of the mixing chamber 60 to thereby blend with the raw influent stream as shown in Figure 6. The ionized white-water micro-bubbles blend with the negatively-charged organic contaminants to form large buoyant clusters of micro-bubble-coated organic particles. The resulting stream herein (consisting of the

HPOM white-water and raw influent) is referred to as a white-water process (WWP) stream.

a1 cont.

The WWP stream is discharged (as designated by flow arrow Y in Figure 1B and in Figure 7), via a tangential port 72, into the base of a hydrocyclone separator or separator where, because of the centrifugal rotation create an upward vortex column therein with high-pressure at the outer perimeter of the separator and lower pressures at the center of the vortex column. The divergent pressures of the WWP stream causes waste, which is covered with micro-bubbles, to separate from the WWP stream and further coalesce at the center (referred to as the waste water stream) and, thereby, causes clean or decontaminated water to separate from the remaining WWP stream at the high pressure perimeter (the decontaminated water is referred to as the DCW stream). The DCW stream is relatively clear and the waste water stream bears the color characteristics of the waste contaminants therein. Heavy and/or larger contaminants may be deposited into a sump 73 at the bottom of the separator and are drained therefrom at the drain port 74.

<u>Amendments to page 24, lines 11 through 20</u>:

a2

Reference is now made to Figures 2 and 6. As the HPOM stream is forced into the blender 51 through the blender inlet port 52, raw influent is brought into the blender 51 through the raw influent inlet port 62; at a significantly lower pressure than the

pressure of the HPOM stream (preferably at zero to negative pressure). The effect is created by the disk suction pump 61 which draws the raw influent and the HPOM into the blender 51 [as well as out of the blender 51]. This disk suction pump 61 is a conventional vacuum pump such as Model/Part Number 215T CP3768T-4 402-12 provided by the DISCFLO Corporation of San Diego, California or its equivalent. The positioning of the disk suction pump 61, as illustrated in Figure 2, is important. It should be positioned between the blender exit port 54 and the separator inlet port 72 in order to draw raw influent and HPOM into and out of the blender 51 while in the process minimizing, if not eliminating completely, the shear and separation effects created by other pumps as described below.

a2 cont.

Amendments to Claims:

63. (first amendment) A method of removing contaminants from influent water which comprises the steps of:

(a) directing oxygenated ozone-treated water into an air saturator;

(b) directing air at a pressure of between about 80 psi to about 150 psi into said air saturator to saturate said oxygenated ozone-treated water thereby creating a high-pressure oxygenated ozone-treated water mixture;

a3

(c) directing said high-pressure oxygenated ozone-treated water mixture to a blender;

(d) at a pressure substantially lower than the pressure of said high-pressure oxygenated ozone-treated water mixture, directing influent water containing at least some contaminants to said blender;

(e) mixing said high-pressure oxygenated ozone-treated water mixture and said influent water thereby creating a plurality of micro-bubbles and entraining particles in a resulting white-water mixture;

a3 cont.

(f) directing said white-water mixture to a separator;

(g) effecting said directing of steps (c), (d), and (f) by a suction device attached between an outlet port of said blender and an inlet port of said separator.

(h) causing said white-water mixture to rotate about an axis in said separator so that waste water, with entrained contaminants, is separated from said white-water mixture by coalescing along said axis, and decontaminated water separated from said white-water mixture away from said axis and from said waste water;

(i) removing said waste water; and

(j) removing said decontaminated water.

a4

74. (first amendment) The method according to claim 73 further comprises cleaning said filter and directing a resultant product to said blender.

<u>Claims Added</u>:

75. A method of removing contaminants from influent water which comprises the steps of:

(a) directing oxygenated ozone-treated water into an air saturator;

(b) directing air at a pressure of between about 80 psi to about 150 psi into said air saturator to saturate said oxygenated ozone-treated water thereby creating a high-pressure oxygenated ozone-treated water mixture;

(c) directing said high-pressure oxygenated ozone-treated water mixture, through a plurality of nozzles on a wall of a mixing chamber of said blender, to said mixing chamber;

(d) at a pressure substantially lower than the pressure of said high-pressure oxygenated ozone-treated water mixture, directing influent water containing at least some contaminants, through a plurality of slots adjacent to said mixing chamber, to said mixing chamber;

(e) mixing said high-pressure oxygenated ozone-treated water mixture and said influent water in said mixing chamber thereby creating a plurality of micro-bubbles and entraining particles in a resulting white-water mixture;

(f) directing said white-water mixture to a separator;

(g) causing said white-water mixture to rotate about an axis in said separator so that waste water, with entrained contaminants, is separated from said white-water mixture by coalescing along said axis, and decontaminated water separated

from said white-water mixture away from said axis and from said waste water;

(h) removing said waste water; and

(i) removing said decontaminated water.

76. The method according to claim 75 further comprises effecting said directing of steps (c), (d), and (f) by a suction device pump attached between an outlet port of said blender and an inlet port of said separator.

77. The method according to claim 75 wherein said mixing is increased by causing turbulent flow over dimples in walls of said blender.

G6 cont.

78. The method according to claim 75 further including regulating pressure of water passing from said air saturator to said blender at a predetermined level at between about 80 psi to about 150 psi.

79. The method according to claim 78 wherein said pressure is regulated to approximately 120 psi.

80. The method according to claim 75 further comprises collecting heavy particles at a lower end of said separator.

81. The method according to claim 75 further comprises removing air bubbles and buoyant particles from a predetermined location at about an upper end of said separator.

82. The method according to claim 81 further comprises removing air and any gases present from an upper end of said separator above said predetermined location.

83. The method according to claim 82 further comprises filtering toxins from said any gases present.

84. The method according to claim 75 further comprises filtering and reclaiming said waste water for additional treatment.

85. The method according to claim 84 further comprises returning filtered waste water to said blender.

a5 cont.

86. The method according to claim 84 further comprises capturing recyclable waste in a filter and removing said recyclable waste for recycling.

87. The method according to claim 86 further comprises cleaning said filter and directing a resultant product to said blender.